

instant invention; and there is no attempt to use an induced dipole. This orientation would not work in the instant invention, and the parallel dipole orientation of the instant invention would not work in the Rabinowitz et al. invention.

II. Specific Responses to Points Raised in Office Action Mailed Sept. 22, 2004

The subject numbers used here correspond to those of Examiner Tra's Action. I quote his relevant statements and give our replies.

1. Disclosure Informality Objection

Applicant thanks Examiner Tra for bringing these misspellings to my attention.

I hereby request that the following changes please be made in the specification: Page 13, line 2, please change "because the" to --because the--.

Page 14, last Paragraph, line 2, please change "soley" to --solely--.

I hereby request that "electodes" be changed to --electrodes-- in Claims 4, 5, 6, 11, 12, 13, 18, 19 and 20.

2. "Claims 2, 9, and 16 is rejected under 35 U.S.C. 112 ..."

Applicant respectfully disagrees. Claims 2, 9, and 16 recite "wherein an electret is placed adjacent to each micro-mirror so that its permanent electric dipole is parallel to said induced electric dipole". An equivalent statement to the recitation of Claims 2, 9, and 16 is present in the last sentence of Paragraph 2 p. 12. The entire paragraph is quoted here with the relevant part of the last sentence in bold face for emphasis:

"An electret 5 is used to augment the torque. In equilibrium i.e. when the rotation is complete, the polarization due to the electret 5 and that due to the induced charges of the conducting micro-mirrors 2 add together to produce a total dipole moment d parallel to the micro-mirrors 2, and parallel to the applied electric field E . The positive + end 4 and the negative - end 3 of the electret 5 align themselves parallel to the electric field E due to the torque interaction of the permanent electric dipole moment of the electret 5 and the applied electric field E , which is proportional to their product. Since the electret 5

and its dipole moment are parallel to the micro-mirrors 2, this torque interaction aligns the micro-mirrors 2 parallel to the applied electric field E."

As stated in this paragraph, the permanent electric dipole is parallel to each micro-mirror which is parallel to the induced electric dipole as shown in Figures 1a, 1b, and 1c and described in detail in the specification. In general terms: If A is parallel to B and B is parallel to C, then A is parallel to C. Therefore the specification teaches that the "permanent electric dipole is parallel to said induced electric dipole" as recited in Claims 2, 9, and 16. This is also shown in Figs. 1a, 1b, and 1c, where the electret 5 is sandwiched between the two mirrors in a parallel orientation with its + and - ends at the extremities of the mirror.

Even though Applicant feels that Claims 2, 9, and 16 are properly supported by both text and drawings in his specification, in the spirit of compromise these claims have been amended.

3. Quotation of 35 U.S.C. 102 (e): Described in a Prior Patent Filing.
4. "Claims 1 are rejected under 35 U.S.C. 102 (e) as being anticipated by Rabinowitz et al. (U.S. Pat. 6,738,176B2))."

"a) With respect to claims 1 and 8, Rabinowitz et al. discloses a dynamic multiwavelength switching ensemble ..."

Applicant respectfully disagrees. The Rabinowitz et al patent is not a solar concentrator patent. It is a Switching patent. The teaching and claims in it are only related to switching. Having written this Rabinowitz et al patent I am very familiar with both its intent and content. No part of it is in anyway related implicitly or explicitly to the instant invention. No variation of the words "solar" or "sun" occur anywhere in the patent. No variation of the concept "induced electric dipole" or the word "induced" occur anywhere in the patent. The Rabinowitz et al. patent teaches and claims "permanent electric dipole" and "permanent magnetic dipole" control. As shown in Figures 1 - 4 and the

teachings, these permanent dipoles are oriented perpendicular to the mirrors, and this orientation is contrary to the instant invention; and there is no attempt to use an induced dipole. This orientation would not work in the instant invention, and the parallel dipole orientation of the instant invention would not work in the Rabinowitz et al. invention. Nevertheless, in the interest of conciliation, these claims have been amended to include the further restriction "for concentrating solar energy" in the clauses in addition to this already present restriction in the preamble.

"b) With respect to claim 15, Rabinowitz et al. discloses a dynamic multiwavelength switching ensemble ..."

Applicant respectfully disagrees. The arguments above apply here as well. No variation of the concept "induced electric dipole" or the word "induced" occur anywhere in the patent. The Rabinowitz et al. patent teaches and claims "permanent electric dipole" and "permanent magnetic dipole" control. As shown in Figures 1 - 4 and the teachings, these permanent dipoles are oriented perpendicular to the mirrors, and this orientation is contrary to the instant invention; and there is no attempt to use an induced dipole. This orientation would not work in the instant invention, and the parallel dipole orientation of the instant invention would not work in the Rabinowitz et al. invention.

"c) With respect to claims 2, 9, and 16, Rabinowitz et al. further discloses wherein an electret is placed adjacent to each micro-mirror so that its permanent electric dipole is parallel to the induced electric dipole. (col. 5, lines 46-48)."

Not only does the Examiner's statement "an electret is placed adjacent to each micro-mirror so that its permanent electric dipole is parallel to the induced electric dipole. (col. 5, lines 46-48)" not appear in (col. 5, lines 46-48), it does not --nor does any variation of it -- appear anywhere in the Rabinowitz et al patent. No variation of the concept "induced electric dipole" or the word

"induced" occur anywhere in the patent. The Rabinowitz et al. patent teaches and claims "permanent electric dipole" and "permanent magnetic dipole" control. As shown in Figures 1 - 4 and the teachings, these permanent dipoles are oriented perpendicular to the mirrors, and this orientation is contrary to the instant invention; and there is no attempt to use an induced dipole. This orientation would not work in the instant invention, and the parallel dipole orientation of the instant invention would not work in the Rabinowitz et al. invention.

"d) With respect to claims 3, 10, and 17, Rabinowitz et al. further discloses an electret is sandwiched between pairs of micro-mirrors (2)."

No variation of the words "pair" nor the concept "sandwiched between pairs of micro-mirrors" occurs anywhere in the Rabinowitz et al. patent. No pairs of micro-mirrors are shown or taught, much less having an electret between them.

"e) With respect to claims 7, 14, and 21, Rabinowitz et al. discloses the means for producing the induced electric dipole is an intermittent voltage source."

This is not at all the case. No variation of the word "intermittent" or of the concept "induced electric dipole by means of an intermittent voltage source" occurs anywhere in the Rabinowitz et al. patent. The purpose of voltage switching in that patent is to produce optical switching by acting on the permanent electric or magnetic dipoles, not to induce an electric dipole.

5. Quotation of 35 U.S.C. 103 (a): Obviousness

6. "Claims 5, 12, and 19 are rejected under 35 U.S.C. 103 (a) as being unpatentable over Rabinowitz et al.((U.S. Pat. 6,738,176B2))."

"Rabinowitz et al. discloses a dynamic multiwavelength switching ensemble ..."

The Rabinowitz et al patent is not a solar concentrator patent. It is a Switching patent. So it is not obvious to apply it to a solar concentrator patent.

Non-obviousness is also supported by the fact that there is no prior art in the solar concentrator field that makes this connection. The teaching and claims in it are only related to switching. No part of the Rabinowitz et al is in anyway related implicitly or explicitly to the instant invention. No variation of the words "solar" or "sun" occur anywhere in the patent. No variation of the concept "induced electric dipole" or the word "induced" occur anywhere in the patent. The Rabinowitz et al. patent teaches and claims "permanent electric dipole" and "permanent magnetic dipole" controlled by a grid shown in Fig. 7, not by "partitioned rectangular top and bottom sices of a rectangular parallelepiped" as shown and taught in the instant invention. No variation of the words "partitioned", "segmented", "rectangular", "square", "parallelepiped" or the concept of "orientation control by partitioned rectangular top and bottom sides of a rectangular parallelepiped" occurs anywhere in the Rabinowitz et al patent. Furthermore, as shown in their Figures 1 - 4 and teachings, their permanent dipoles are oriented perpendicular to the mirrors, and this orientation is contrary to the instant invention; and there is no attempt to use an induced dipole. This orientation would not work in the instant invention, and the parallel dipole orientation of the instant invention would not work in the Rabinowitz et al. invention. Nevertheless, in the spirit of conciliation, parent Claims have been amended to include the further restriction "for concentrating solar energy" in the clauses in addition to this already present restriction in the preambles.

7. "Claims 4, 6, 11, 13, 18, and 20 are objected to as being dependent upon a rejected base claim, but would be allowable"

Applicant thanks Examiner Tra for considering Claims 4, 6, 11, 13, 18, and 20 as being allowable. Since Applicant respectfully thinks he has shown that the base claims are also allowable, he has not rewritten these claims in independent form.

8. "The prior art of record and not relied upon"

CLAIMS

1 (amended): A micro-optics solar concentrator comprising:

- a) an array of rotatable micro-mirrors for concentrating solar energy;
- b) means for producing an induced electric dipole in each of said rotatable micro-mirrors;
- c) opposingly faced pairs of electrodes in a grid array for coupling to said induced electric dipole;
- d) means for selectively addressing a pair of said electrodes; and
- e) means for establishing independent voltages at the corners of said electrodes.

2 (amended): The apparatus of claim 1, wherein an electret is placed adjacent to each micro-mirror so that its permanent electric dipole is parallel to said induced electric dipole micro-mirror.

3 (original): The apparatus of claim 1, wherein an electret is sandwiched between each pair of micro-mirrors.

4 (original): The apparatus of claim 1, wherein said pair of electrodes are fragmented wires forming the edges of the top and bottom faces of a rectangular parallelepiped.

5 (original): The apparatus of claim 1, wherein said pair of electrodes are partitioned rectangular top and bottom sides of a rectangular parallelepiped.

6 (original): The apparatus of claim 1, wherein one electrode forms the partitioned rectangular side of one face of a rectangular parallelepiped that is opposite a fragmented wire electrode forming the side edges of the opposite face.

7 (original): The apparatus of claim 1, wherein the means for producing said induced electric dipole is an intermittent voltage source.

8 (amended): A method of concentrating solar energy provided by an array of rotatable micro-mirrors comprising the steps of:

- a) producing an induced electric dipole in each of said rotatable micro-mirrors
for concentrating solar energy;
- b) producing a grid array of independently orientable electric fields for coupling to the induced electric dipoles;
- c) addressing said grid array; and
- d) aligning said rotatable micro-mirrors by means of said electric fields;

9 (amended): The method of claim 8 further comprising the step of placing an electret adjacent to each micro-mirror so that its permanent electric dipole is parallel to said ~~induced electric dipole~~ micro-mirror.

10 (original): The method of claim 8 further comprising the step of sandwiching an electret between each pair of micro-mirrors.

11 (original): The method of claim 8 further comprising the step of producing the electric fields by means of pairs of electrodes in the form of fragmented wires forming the edges of the top and bottom faces of a rectangular parallelepiped.

12 (original): The method of claim 8 further comprising the step of producing the electric fields by means of pairs of electrodes in the form of partitioned rectangular top and bottom sides of a rectangular parallelepiped.

13 (original): The method of claim 8 further comprising the step of producing the electric fields by means of pairs of electrodes wherein one electrode forms the partitioned rectangular side of one face of a rectangular parallelepiped that is opposite a fragmented wire electrode forming the side edges of the opposite face.

14 (original): The method of claim 8 further comprising the step of producing the electric fields by means of an intermittent voltage source.

15 (original): A focussing and directing concentrator of reflected light comprising:

- a) an array of rotatable micro-mirrors
- b) means for producing an induced electric dipole in said rotatable micro-mirrors;
- c) opposingly faced pairs of electrodes in a grid array for coupling to said induced electric dipole;
- d) means for selectively addressing a pair of said electrodes; and
- e) means for establishing independent voltages at the corners of said electrodes.

16 (amended): The apparatus of claim 15, wherein an electret is placed adjacent to each micro-mirror so that its permanent electric dipole is parallel to said induced electric dipole micro-mirror.

17 (original): The apparatus of claim 15, wherein an electret is sandwiched between each pair of micro-mirrors.

18 (original): The apparatus of claim 15, wherein said pair of electrodes are fragmented wires forming the edges of the top and bottom faces of a rectangular parallelepiped.

19 (original): The apparatus of claim 15, wherein said pair of electrodes are partitioned rectangular top and bottom sides of a rectangular parallelepiped.

20 (original): The apparatus of claim 15, wherein one electrode forms the partitioned rectangular side of one face of a rectangular parallelepiped that is opposite a fragmented wire electrode forming the side edges of the opposite face.

21 (original): The apparatus of claim 15, wherein the means for producing said induced electric dipole is an intermittent voltage source.

CLAIMS

1 (amended): A micro-optics solar concentrator comprising:

- a) an array of rotatable micro-mirrors for concentrating solar energy;
- b) means for producing an induced electric dipole in each of said rotatable micro-mirrors;
- c) opposingly faced pairs of electrodes in a grid array for coupling to said induced electric dipole;
- d) means for selectively addressing a pair of said electrodes; and
- e) means for establishing independent voltages at the corners of said electrodes.

2 (amended): The apparatus of claim 1, wherein an electret is placed adjacent to each micro-mirror so that its permanent electric dipole is parallel to said micro-mirror.

3 (original): The apparatus of claim 1, wherein an electret is sandwiched between each pair of micro-mirrors.

4 (original): The apparatus of claim 1, wherein said pair of electrodes are fragmented wires forming the edges of the top and bottom faces of a rectangular parallelepiped.

5 (original): The apparatus of claim 1, wherein said pair of electrodes are partitioned rectangular top and bottom sides of a rectangular parallelepiped.

6 (original): The apparatus of claim 1, wherein one electrode forms the partitioned rectangular side of one face of a rectangular parallelepiped that is opposite a fragmented wire electrode forming the side edges of the opposite face.

7 (original): The apparatus of claim 1, wherein the means for producing said induced electric dipole is an intermittent voltage source.

8 (amended): A method of concentrating solar energy provided by an array of rotatable micro-mirrors comprising the steps of:

- a) producing an induced electric dipole in each of said rotatable micro-mirrors for concentrating solar energy;
- b) producing a grid array of independently orientable electric fields for coupling to the induced electric dipoles;
- c) addressing said grid array; and
- d) aligning said rotatable micro-mirrors by means of said electric fields;

9 (amended): The method of claim 8 further comprising the step of placing an electret adjacent to each micro-mirror so that its permanent electric dipole is parallel to said micro-mirror.

10 (original): The method of claim 8 further comprising the step of sandwiching an electret between each pair of micro-mirrors.

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12 (original): The method of claim 8 further comprising the step of producing the electric fields by means of pairs of electrodes in the form of partitioned rectangular top and bottom sides of a rectangular parallelepiped.

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14 (original): The method of claim 8 further comprising the step of producing the electric fields by means of an intermittent voltage source.

15 (original): A focussing and directing concentrator of reflected light comprising:

- a) an array of rotatable micro-mirrors
- b) means for producing an induced electric dipole in said rotatable micro-mirrors;
- c) opposingly faced pairs of electrodes in a grid array for coupling to said induced electric dipole;
- d) means for selectively addressing a pair of said electrodes; and
- e) means for establishing independent voltages at the corners of said electrodes.

16 (amended): The apparatus of claim 15, wherein an electret is placed adjacent to each micro-mirror so that its permanent electric dipole is parallel to said micro-mirror.

17 (original): The apparatus of claim 15, wherein an electret is sandwiched between each pair of micro-mirrors.

18 (original): The apparatus of claim 15, wherein said pair of electrodes are fragmented wires forming the edges of the top and bottom faces of a rectangular parallelepiped.

19 (original): The apparatus of claim 15, wherein said pair of electrodes are partitioned rectangular top and bottom sides of a rectangular parallelepiped.

20 (original): The apparatus of claim 15, wherein one electrode forms the partitioned rectangular side of one face of a rectangular parallelepiped that is opposite a fragmented wire electrode forming the side edges of the opposite face.

21 (original): The apparatus of claim 15, wherein the means for producing said induced electric dipole is an intermittent voltage source.

Respectfully submitted,

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